CONSIDERATIONS OF THE ECOLOGICAL REHABILITATION IN THE BICAZ CHEI QUARRY (NEAMȚ COUNTY)

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ABSTRACT

In Romania practical concerns for ecological ingrowths, based on deep and long-term fundamental research on biodiversity, environmental protection and sustainable use of natural and anthropogenic resource heritage were important objectives of the research institutes and higher education colleges, in the last three decades, synchronized on an European and global level. (D. Malschi D, 2010). Bicaz Keys Quarry is a complex quarry in all aspects, with the likely ecological rehabilitation and restoration of the landscape. For good ecological rehabilitation in mining quarrys it is necessary first to know the biodiversity in the area in all its complexity. Environmental issues in mining requires a systematic approach and sustainable environmental management techniques must be applied as fairly mining areas around the world. It is necessary to establish strategic principles and elements for ensuring sustainable development in a mining quarry. Biodiversity conservation is extremely important for me personally means the continuance of life on Earth, knowing and protecting biodiversity in all its complexity, involving several aspects: scientific, educational, social, economic, political, ethical, cultural. Local authorities need to do more and we all with them.

INTRODUCTION

The quarry mine Bicaz Gorge is situated in the North-East part of Romania, close to the established and spectacular gorges – Bicaz Gorge. Within this study had been aimed the identification, description, diversity, ecological analysis and monitoring of the herbal and wooden vegetal communities, which belong to the Natura 2000 habitats and implicitly of the rare plant species, vulnerable, endemic whitin Quarry Bicaz Gorge and from the surroundings, concidering that it can be found by the contact limit of two protected areas: ROSCI0033 Sugaului-Munticelu Gorge and Bicazului-Hasmas Gorge National Park (Niculescu, 2016). Flora found in thequarry's area is specific to the limestone substrate from the mountains, with local climatic influences. In the quarry's area and in the immediate vicinity were identified a very rich and diverse flora. Cormoflora encountered in [illegible]sented by a large number of taxons and infrataxons. So, cormoflora of investigated area is represented by a number of 648 taxons and infrataxons, including a number of species, rare, vulnerable and endangered. From the rare endemic plant species identified in the quarry we remembered *Aconithum moldavicum, Androsace villosa* subsp. *arachnoidea*, *Astragalus pseudopurpureus, Campanula carpatica*, *Dianthus spiculifolius, Doronicum carpaticum*, *Erysimum witmannii* subsp. *transsilvanicum*, *Festuca porcii*, *Gypsophila petraea, Helictotrichon decorum*, *Hepatica transsilvanica*, *Gentiana phlogifolia*, *Hieracium pojoritense*, *Jovibarba sobolifera, Larix decidua* subsp. *carpatica*, *Leontopodium alpinum, Onobrychis montana* subsp. *transsilvanica*, *Primula elatior* subsp. *leucophylla*, *Scabiosa lucida* subsp. *barbata etc.* (Niculescu, 2016).

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Herbaceous vegetation is represented by: saxicola vegetation, debris vegetation, grassland vegetation of tall grasses, hygrophile vegetation, ruderal vegetation, limestone tuff vegetation. Every vegetal communities from here are important. But a special role is represented by the most important plant communities are rocky and meadows.

Woody vegetation is the vegetation of forests and thickets, especially characteristic limestone substrate. The main forest plant associations found here are: *Leucobryo - Pinetum* Matusz. 1962 (Syn.: *Myrtillo-Pinetum* Burduja et Ştefan 1982 (art. 29); *Betulo-Pinetum* Burduja et Ştefan 1982); *Hieracio rotundati-Piceetum* Pawl. et Br.- Bl. 1939; *Symphyto cordati-Fagetum* Vida (1959) 1963; *Pulmonario rubrae-Fagetum* (Soó 1964) Täuber 1987; *Leuchanthemo walsteinii-Fagetum* (Soó 1964) Täuber 1987; *Coryletum avellanae* Soó 1927; *Salicetum albae* Issler 1924; *Salicetum purpureae* (Soó 1934 n.n.) Wendelbg.-Zelinky 1952; *Telekio speciosae-Alnetum incanae* Coldea (1986) 1990. From the schrubs vegetation we can mention: phytocoenosis with *Rubus idaeus*, formations with *Juniperus communis* in limestone areas or meadows, and phytocoenosis assigned to plant community *Juniperetum sabinae* Csuros 1958 (Niculescu, 2016).

MATERIAL AND METHOD

Studies will start by a good bibliographic documentation about the physical and geographical conditions: relief, geology, hydrography, soil and local climate conditions. To identificate the species and the infrataxons it will be used: Romanian's Flora and Flora Europaea. In studying the vegetation we will use phytosociology research methods in the way of central european school. The investigated area including Bicaz Gorge quarry is characterized by highly complex eco-pedo-climatic, geographic, flora and fauna, landscape, with a potential agro-tourist great around and with a population that preserves the traditions of the life that day of day (Niculescu, 2016). Bicaz Gorge quarry is a complex quarry were is very important a good ecological rehabilitation.

RESULTS AND DISCUSSIONS

Considerations of the ecological rehabilitation in the Bicaz Chei quarry

In this project we also executed a study of ecological rehabilitation of the area in which completed mining. n order to achieve a good restoration of this area have been taken into account the type of native vegetation, existing here and in the surrounding area, in order to avoid the fragmentation of habitats, as well as the existence of a "wishlist" obvious species to knock and to conquer new lands in this area. Very important**,** I realized a study with the degree of the striking root (grip) and adaptability of cormoflora in the Bicaz-Chei Quarry. I gave the species notes from 1 to 10 after the with the degree of the striking root (grip) and adaptability in this area. I realized this after I noticed the ,,desire,, of the species to occupy this (Table no. 1). This demonstrates that there are sufficient conditions for quarry restoration of natural habitats and the degree of pollution is low enough (or it can be reduced to a minimum, without great effort). Of the species with a wide grip and power regeneration can refer to 2 species of utmost importance: *Campanula carpatica* and *Pinus sylvestris*. Here was a very high power of germination and regeneration from seeds of the species Pinus sylvestris-species for native vegetation in the area, pollute the species for Habitat 91Q0.

I tried also restoring ,,ex situ,, plant communities.

The experiment succeeded both in pots and on ground vegetation skeletal.

Several species were collected, planted a few flower pots, using soil samples from both a career and a good soil fertility, taken from a different region. It was found a very good evolution of these species on both soil types, a great vitality, they thrived and even seized without any problems. This demonstrates once again that in the area there is a tremendous potential for ecological rehabilitation with natural regeneration of native species, the species also has a great potential, and anthropic pressure, obviously have a low intensity. The only thing, I recommend is to spray with water regularly go on moving trucks with material on its way to siphoned Crusher. This would reduce dust and would be

a much better development of vegetation, but also a development and an expansion of the Habitat 7220* (who is affected and because of dust, in addition to other disruptive factors).

Another study relating to ecological rehabilitation was achieved at the level of the step at which the exploitation rights was concluded. Thus, taking into account the native vegetation from the surrounding area of this steps, the observations with regard to the power of pine seed germination, viability, growth of the young trees already emerging, ecological conditions and other major factors, we proposed a scheme of afforestation which has the core species species Pinus sylvestris, presented in the table no. 1.Thus, for this area we can apply successfully the following reforestation scheme (Table No. 1). The planting distance was set at 2 x 1 m. We can the basic species *Pinus sylvestris*, a genuine species forming a plant community right next to the wooded area. In addition to this species we've also used mix species having the role to support the other ones. This species I noticed that has an excellent grip here. For an area of 100 m^2 - 50 seedlings were necessary compared to 4/1 meaning a number of 40 of *Pinus sylvestris* and 10 mixed species. Mixing species were: *Fagus sylvatica, Picea excelsa and Acer pseudoplatanus.* Viability, increases, the degree of regeneration and plant's health of the trees in the area, legally justify way the introduction of sylvester pine in this area and in this type of resort. The weakening of the vitality is relatively good in the area Bicaz Chei Quarry for the arboretums. In this area the trees grow in soil conditions with yellowish brown podzolic soil acid, skeletal system, poor in humus thickness on the physiological 20-30 cm. In order to rehabilitate the area through arboretums of pine after afforestation scheme proposed it was first conducted a complex study in terms of station, typological, silvobiologic, silvicultural, phytosanitary, databases fitting. The nature and intensity of the degradation of the land does not affect too much the development of the first *Pinus sylvestris* than 5-10 years. Soil conditions does not affect too much the development of the species *Pinus sylvestris*. It has a fairly good growth in heavy soil conditions such as rocky areas and very strong soils and heavily eroded even if they are superficial. The only problem is the soil clayey, but in the area of the Bicaz Quarry is not the case, so the *Pinus sylvestris* has good soil conditions for rehabilitation here. However, in the case of rehabilitation by planting the *Pinus sylvestris*, a good preparation of the land leading to a lifting of the rate and increases grip in the early years. Ecological rehabilitation in this area, using native species, is crucial because the zone presents a characteristic and important 91Q0 Habitat, but also for the fact that pine trees provides good protection of the soil, soil improvement, ground stabilisation, particularly in his youth. These the forest of *Pinus sylvestis* presents a very large role in terms of mat. *Pinus sylvestris* is caractarizează and that of naturally regenerated.

Table no. 1

1	2	3	4	5	6	7	8	9	10
Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi
Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi	Pi
Pi	Pi	Pi	Pi	Pi	Pi	X-Fa	X-Mo	X-Fa	Pi
Pi	Pi	Pi	Pi	Pi	Pi	X-Mo	X-Fa	X-Pa	Pi
Pi	Pi	Pi	Pi	Pi	X- Pa	X-Fa	X-Pa	X-Pa	Pi

Legend:
Pi - *Pinus sylvestris*; 1-10 no. rows; X – species; S=100 m^2; Pa – *Acer pseudoplatanus*; Mo – *Picea excelsa*; Fa – *Fagus sylvatica*

CONCLUSIONS

For good ecological rehabilitation in mining careers it is necessary first to know biodiversitsatea in the area in all its complexity. Environmental issues in mining requires a systematic approach and sustainable environmental management techniques must be applied as fairly mining areas around the world. It is necessary to establish strategic principles and elements for ensuring sustainable development in a mining quarry.

These the forest of *Pinus sylvestis* presents a very large role in terms of mat. *Pinus sylvestris* is caractarizează and that of naturally regenerated. This has been observed in Bicaz Chei Quarry. This phenomenon occurs in areas of rocks, detritus, stabilized slopes where this species has part of the light and has no competition from other woody species.

In conclusion, *Pinus sylvestris* is the main species indictă to rehabilitate the area because it gives very good results at reâmpădurirea degraded lands from the forest area, especially for subarea and the lower part of the *Fagus sylvatica* and *Picea abies* subarea such as in our case.

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